Oral Presentation
Tanja Walker, Laurie Elam-Evans, David Yankey, Benjamin Fredua, Charnetta Williams, James Singleton, Lauri Markowitz, Shannon Stokley

Background:
Disparities in human papillomavirus (HPV) vaccination coverage by metropolitan statistical area (MSA) status were observed in the 2016 National Immunization Survey-Teen (NIS-Teen). HPV vaccination initiation was 16 percentage points lower for adolescents living in non-MSAs and 8 percentage points lower among those living in MSA, non-central cities (MSA-NonCC) compared to those living in MSA, central cities (MSA-CC).

Objectives:
1) To examine trends in HPV vaccination coverage by MSA status. 2) To determine whether there were disparities in HPV vaccination coverage by MSA status during 2013-2016.

Methods:
NIS-Teen is a dual-frame telephone survey of parents/guardians of adolescents aged 13-17 years to monitor vaccination coverage in the United States. With parental/guardian consent, vaccination histories are obtained via a questionnaire mailed to the vaccination provider(s). HPV vaccination coverage (≥1 dose) by MSA status from 2013-2016 was estimated for all adolescents combined. Weighted linear regression by survey year was used to estimate annual percentage point increases in vaccination initiation. Analyses accounted for complex survey design.

Results:
There were 82,125 adolescents in the sample—39.7% lived in MSA-CCs, 39.1% lived in MSA-NonCCs, and 21.3% lived in non-MSAs. Compared with those living in MSA-CCs, HPV vaccination initiation was 12-16 percentage points lower for adolescents living in non-MSAs—12.5 in 2013, 12.1 in 2014, 14.4 in 2015, and 15.5 in 2016 and 5-9 percentage points lower for adolescents living in MSA-NonCCs—5.2 in 2013, 7.4 in 2014, 8.9 in 2015, and 7.5 in 2016. The average annual percentage point increases during 2013-2016 were 5.7 for MSA-CC, 4.9 for MSA-NonCC, and 4.6 for non-MSA.

Conclusion:
From 2013 – 2016, HPV vaccination initiation increased in each MSA. Coverage in non-MSAs and MSA-NonCCs were substantially lower than coverage in MSA-CCs. A better understanding of variations in HPV vaccine initiation by MSA status is needed to identify and implement targeted strategies to improve HPV vaccination coverage.
Oral Presentation
Understanding disparities in human papillomavirus vaccination coverage among adolescents by metropolitan statistical area (MSA) status, United States, National Immunization Survey – Teen, 2016
Charnetta Williams, Tanja Walker, Laurie Elam-Evans, David Yankey, Benjamin Fredua, Mona Saraiya, Shannon Stokley

Background:
The Advisory Committee on Immunization Practices recommends adolescents aged 11–12 years routinely receive human papillomavirus (HPV) vaccine. The 2016 National Immunization Survey-Teen (NIS-Teen) highlighted a disparity in HPV vaccination coverage with 8-16% lower ≥1-dose coverage among teens in suburban and mostly-rural areas, compared to mostly-urban areas.

Objectives:
To identify factors associated with non-initiation of HPV vaccination by metropolitan statistical area (MSA).

Methods:
NIS-Teen is an annual survey monitoring vaccination coverage among adolescents aged 13–17. Sociodemographic characteristics are obtained from parent/guardian interview and vaccination histories from adolescents’ healthcare provider(s). MSA-central cities are “mostly-urban”; MSA, non-central cities are “suburban”; and non-MSAs are “mostly-rural.” Univariate and multivariable logistic regression identified factors associated with not initiating vaccination by MSA status. Analyses accounted for the complex survey design; statistical significance was set at 0.05.

Results:
Among 20,475 adolescents in the sample, 8,231 (40.0%) did not initiate HPV vaccination, with 34.1% in mostly-urban (reference), 41.5% in suburban (p <0.05) and 49.6% in mostly-rural areas (p <0.05). Variables associated with not initiating vaccination in all MSAs included not having an 11–12 year old well-child visit [mostly-urban: adjusted prevalence ratio (aPR) 1.5 (95%CI: 1.3-1.7); suburban: aPR 1.3 (95%CI: 1.1-1.4); mostly-rural: aPR 1.2 (95%CI: 1.1-1.4)] and not receiving a provider recommendation for vaccination [mostly-urban: aPR 2.1 (95%CI: 1.9-2.4); suburban: aPR 2.1 (95%CI: 1.9-2.2); mostly-rural: aPR 1.9 (95%CI: 1.7-2.2)]. Compared to teens in mostly-urban areas (42.4%), a higher percentage in mostly-rural areas (54.4%) had no 11–12 y.o. well-child visit, p <0.05. Also, 73.1% of teens in mostly-rural areas did not receive a provider recommendation for vaccination compared to 65.1% in suburban, and 55.7% in mostly-urban areas, p <0.05.

Conclusion:
Some factors associated with not initiating HPV vaccination are more common in suburban and mostly-rural areas. Addressing this disparity will require more work to understand reasons for these differences.
**Oral Presentation**

Trends in HPV Vaccination Initiation Nationally and Regionally By Age 13 and by Age 15 Years by Birth Cohort Analysis Using NIS-Teen 2011-2016.

DAVID YANKEY, BENJAMIN FREDUA, Laurie Elam-Evans, Tanja Walker, Holly Hill, Seth Meador, James Singleton, Shannon Stokley

**Background:**

Human Papillomavirus (HPV) causes about 31,500 new cancer cases in the United States each year. HPV vaccination is recommended for adolescents at ages 11-12 years by the Advisory Committee on Immunization Practices (ACIP). However, HPV vaccination coverage remains low nationally and lags behind other recommended vaccines. Examination of trends in HPV vaccination coverage by birth cohort during early adolescence may be useful.

**Objectives:**

To estimate HPV vaccination initiation trends among adolescents (male and females) nationally and regionally by age 13 and 15 years, by annual birth cohort.

**Methods:**

The National Immunization Survey-Teen (NIS-Teen) is a dual-frame telephone survey of parents/guardians of adolescents aged 13-17 years in the United States. Vaccination data are collected from surveys mailed to vaccination providers after consent from respondent parents or guardians. NIS-Teen data from 2011-2016 were analyzed to estimate HPV vaccination initiation coverage by annual birth cohort among adolescents (male and females) born 1995-2001. We used Kaplan-Meier method to account for censoring of vaccination status before adolescent reaches age 15 years. We used t-tests to compare differences in coverage estimates among the 10 Health and Human Services (HHS) regions.

**Results:**

Nationally, HPV vaccination initiation by age 13 years increased, from 13.4% among the 1995 birth cohort to 41.4% among the 2001 birth cohort. Similar increases were observed in most regions (e.g. for the 2001 birth cohort the range across regions by age 13 and 15 years are (37.4% - 52.2%) and (52.0% - 66.6%) respectively). HPV vaccination initiation by age 15 years also increased, from 24.1% among the 1995 birth cohort to 56.3% among the 2001 birth cohort, with most regions reflecting similar patterns.

**Conclusion:**

Although initiation of the HPV vaccine series by age 13 and 15 years has increased, many adolescents remained unvaccinated. Efforts are needed to increase HPV vaccination at the recommended age.
Oral Presentation
Temporal trends in human papillomavirus vaccination coverage among females and males, United States, 2007-2016
Rayleen Lewis, Lauri Markowitz

Background:
Human papillomavirus (HPV) vaccination was recommended in the United States for females in 2006 and males in 2011. Coverage can be estimated using self/parent-reported HPV vaccination collected in the National Health and Nutrition Examination Surveys (NHANES) for a wider age range than other national surveys.

Objectives:
We estimated HPV vaccination coverage in 2015-2016 and assessed temporal trends by age.

Methods:
Participants 9-59 years old completed an interview collecting demographic and vaccination information. Coverage was estimated for each two-year NHANES cycle by age group for 2007-2008 to 2015-2016 for females and 2011-2012 to 2015-2016 for males. Temporal trends in coverage were assessed for females from 2007-2008 to 2011-2012 and 2011-2012 to 2015-2016 and for males from 2011-2012 to 2015-2016. We assessed sensitivity and specificity of self/parent-reported vaccination using provider-verified vaccination records from a pilot study.

Results:
In 2015-2016, ≥1 dose coverage among females was highest in 14-19 (54.7%) and 20-24 (56.0%) year-olds and lower in successively older age groups. Among males, coverage of ≥1 dose was highest in 14-19 year-olds (39.5%) and lower at older ages. Coverage was similar in 9-13 year-old females and males. Between 2007-2008 and 2011-2012, there were significant increases in coverage among females younger than 30 years. Between 2011-2012 and 2015-2016, there were significant increases in coverage among female age groups including 20-39 year-olds; male coverage increased among those 9-13, 14-19, and 20-24 years. Self/parent-reported receipt of ≥1 dose had a sensitivity and specificity of 87.0% and 83.3%, respectively. Performance was lower for ≥3 doses.

Conclusion:
HPV vaccination coverage remains low and higher in females than males except in 9-13 year-olds. There have been significant increases in coverage among many age groups of females and males but coverage appears to have stalled in younger females. Self/parent-reported vaccination of ≥1 dose, but not >3 doses, demonstrated adequate validity.